

WHAT IS CLAIMED IS:

1. A slurry for chemical mechanical polishing (CMP) a metal

2 surface of a semiconductor substrate with a polyurethane free

3 thermoplastic foam polishing body, comprising,

4 an acid buffer that maintains said slurry at a pH between

5 about 2.5 and about 4.0 during polishing of a metal surface on a

6 semiconductor substrate; and

7 an abrasive particle stabilizer.

2. The slurry as recited in Claim 1, wherein said pH is

2 between about 2.7 and about 3.2.

3. The slurry as recited in Claim 1, wherein said pH is

2 between about 3.5 and about 4.0.

4. The slurry as recited in Claim 1, wherein said abrasive

2 particle stabilizer comprises molecules that are equivalent to

3 repeating units of polymers comprising abrasive particles in said

4 slurry.

5. The slurry as recited in Claim 4, wherein said abrasive

2 particles comprise colloidal silica particles and said abrasive

3 particle stabilizer comprises silicic acid and silicic salt.

6. The slurry as recited in Claim 5, wherein a ratio of said
2 silicic acid to said silicic salt is between about 100:1 and 1:100.

7. The slurry as recited in Claim 4, wherein said abrasive
2 particles comprise alumina and said abrasive particle stabilizer
3 comprises aluminate salts.

8. The slurry as recited in Claim 1, further including an
2 oxidant and a passivation agent.

9. The slurry as recited in Claim 8, wherein said passivation
2 agent is generated *in situ* from a reaction between said metal
3 surface and said oxidant.

10. The slurry as recited in Claim 9, wherein said oxidant is
2 potassium iodate (KIO₃) said passivation agent is iodine (I₂) and
3 said metal surface includes copper.

11. The slurry as recited in Claim 9, further including a
2 second passivation agent that is not generated *in situ* wherein said
3 passivation agent and said second passivation agent synergistically
4 interact with said metal surface to retard corrosion of said metal
5 surface.

12. A chemical mechanical polishing (CMP) system comprising,

2 a slurry comprising an acid buffer that maintains said slurry

3 at a pH between about 1 and about 6 during polishing of a metal

4 surface on a semiconductor substrate; and

5 a polishing pad that includes a polishing body having a

6 polyurethane-free thermoplastic foam substrate that cooperates with

7 said slurry to remove portions of said metal surface during said

8 polishing.

13. The CMP system as recited in Claim 12, wherein said metal

2 surface comprises copper and copper oxides, and wherein said slurry

3 maintain a higher ratio of said copper to said copper oxides as

4 compared to said ratio in a non-acidic slurry.

14. The CMP system as recited in Claim 12, wherein said

2 polishing body further includes said thermoplastic foam substrate

3 having a surface comprised of concave cells and a polishing agent

4 coating an interior surface of said concave cells.

15. The CMP system as recited in Claim 12, wherein said

2 thermoplastic foam substrate comprises a closed-cell foam of

3 crosslinked homopolymer or copolymers.

16. The CMP system as recited in Claim 12, wherein said

2 closed-cell foam is comprised of a blend of cross-linked ethylene
3 vinyl acetate copolymer and a low or medium density polyethylene
4 copolymer having a ethylene vinyl acetate:polyethylene ratio
5 between about 1:9 and about 9:1.

17. The CMP system as recited in Claim 12, wherein said
2 polishing body has a hardness of between about 30 shore A and about
3 80 shore A.

18. The CMP system as recited in Claim 12, wherein said
2 polishing pad is capable of polishing said metal surface at a
3 removal rate of at least about 2000 Angstroms/minute using a down
4 force of about 20 kPa, a table speed between about 25 rpm and a
5 carrier speed of about 40 rpm.

19. The CMP system as recited in Claim 18, wherein said
2 removal rate has a within wafer non-uniformity of less than about
3 14%.

20. The CMP system as recited in Claim 18, wherein said
2 removal rate is at least about 1000 Angstroms/minute and said
3 removal rate has a within wafer non-uniformity of less than about
4 4%.